Electrical Power and Heat from Crew Waste Using an Integrated Solid Oxide Fuel Cell and Fixed-Bed Gasifier, Phase I

Completed Technology Project (2005 - 2005)

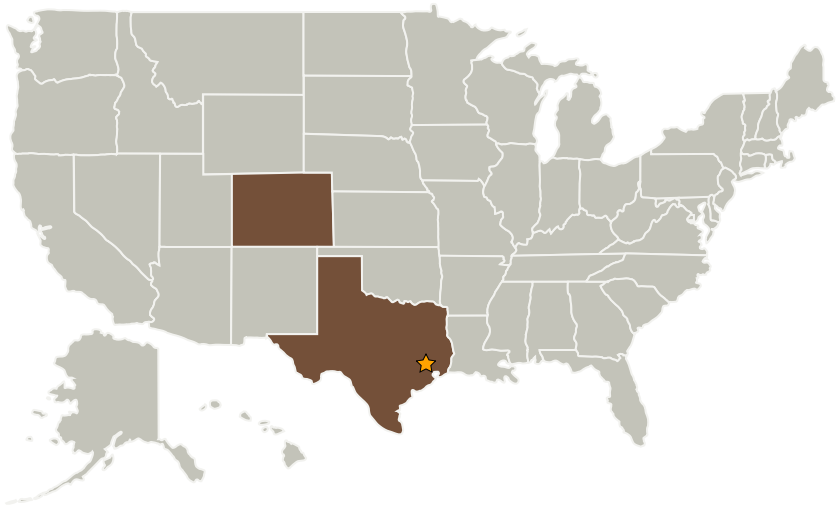
Project Introduction

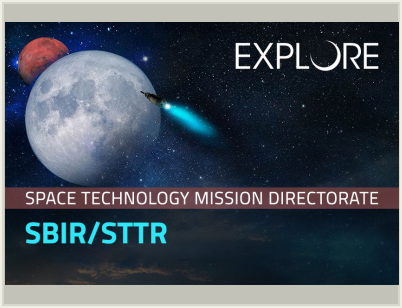
ITN Energy Systems, Inc., along with the Energy and Environmental Research Center (EERC), proposes to develop a highly efficient power generation system capable of converting habitat crew waste from NASA space habitats into electricity and heat. The system will consist of ITN's novel, low-temperature solid oxide fuel cell (SOFC) technology, integrated with a revolutionary, highly efficient gasifier developed by EERC. The waste to energy converter will be specifically designed and engineered to efficiently convert onsite habitat crew waste into electricity and heat. The tight thermal integration of an SOFC to the gasifier will enable the operation of a sub-stoichiometric air gasifier at an elevated temperature (1000

o

C). At this temperature, the high levels of moisture inherent to habitat crew waste will function as an essential carbon gasifying medium, reducing the equivalence ratio at which the gasifier can operate with complete carbon conversion. By utilizing the moisture content of the food waste and the high temperature heat from the SOFC, the gasifier will operate with the addition of little or no air, generating producer gas that has not been heavily diluted with nitrogen. This high quality producer gas is an optimal fuel for a solid oxide fuel cell.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
ITN Energy Systems, Inc.	Supporting Organization	Industry Minority-Owned Business	Littleton, Colorado

Primary U.S. Work Locations	
Colorado	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul Thoen

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.1 Manufacturing Processes